



Surge

Attorney's Docket No.: 07977-208001 / US3511

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Shunpei Yamazaki et al. Art Unit : 2823 ~
Serial No. : 08/994,038 Examiner : W. David Coleman
Filed : December 18, 1997 Confirmation No.: 6059
Title : CHARGE TRANSFER SEMICONDUCTOR DEVICE AND
MANUFACTURING METHOD THEREOF

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

REPLY TO ACTION OF JANUARY 6, 2004

In reply to the office action mailed January 6, 2004, Applicants submit the following remarks.

Claims 2, 6, 11, 12, 14, and 16-26 are pending, with claims 2, 16, 19, 24, 25, and 26 being independent. Claims 1, 3-5, and 13 were previously canceled, and claims 7-10 and 15 are withdrawn. Claims 2, 6, 11, 12, 14 and 16-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,873,003 to Inoue et al. (Inoue) in view of U.S. Patent No. 5,582,640 to Okada et al. (Okada).

Applicant respectfully requests that this rejection be withdrawn, since neither Inoue nor Okada discloses or properly suggests all of the elements recited in at least independent claims 2, 16, 19, 24, 25, and 26, and, accordingly, the Office Action fails to establish a prima facie case of obviousness under 35 U.S.C. 103(a).

For example, independent claim 2 recites (with emphasis added):

A semiconductor device comprising:
a plurality of photodiodes being formed in a matrix on an insulating surface;
a plurality of vertical charge coupled devices on the insulating surface, said vertical charge coupled devices being connected with the plurality of photodiodes;
at least a horizontal charge coupled device on the insulating surface, said horizontal charge coupled device being connected with the vertical charge coupled devices,
wherein at least one of the vertical and horizontal charge coupled devices comprises *a crystalline semiconductor film having a plurality of crystals extending in a crystal growth direction,*

wherein a crystal structure of the crystalline semiconductor film in the crystal growth direction is continuous so that a charge moving is not restricted by a grain boundary,

wherein ***at least one of the vertical and horizontal charge coupled devices that has the crystalline semiconductor film is arranged such that a charge transfer direction of the at least one of the vertical and horizontal charge coupled devices is coincident with the crystal growth direction.***

In rejecting claim 2, the Office Action states in paragraph 3 that Inoue discloses the first-emphasized limitation of "...wherein at least one of the vertical and horizontal charge coupled devices comprises a crystalline semiconductor film having a plurality of crystals extending in a crystal growth direction..." However, Applicant respectfully submits that, in fact, Inoue neither discloses nor properly suggests this claim feature.

Moreover, Applicant notes that the Office Action makes no reference to the portion of Inoue that is thought to provide this teaching, other than a general reference to FIGS. 1-50. In this regard, Applicant respectfully refers to M.P.E.P. 706.02(j), which sets forth the proper contents of a rejection under 35 U.S.C. 103(a), including (with emphasis added) "...the relevant teachings of the prior art relied upon, preferably with reference to the relevant column or page number(s) and line number(s) where appropriate... It is important for an examiner to properly communicate the basis for a rejection so that the issues can be identified early and the applicant can be given fair opportunity to reply." Accordingly, and particularly in view of the length of Inoue, Applicant respectfully requests clarification of the basis for the present rejection of claim 2, or allowance thereof.

Additionally, the Office Action admits that Inoue does not disclose or fairly suggest the second-emphasized recitation of independent claim 2 (above) that "...at least one of the vertical and horizontal charge coupled devices ... is arranged such that a charge transfer direction of the at least one of the vertical and horizontal charge coupled devices is coincident with the crystal growth direction..." and points to Okada for this teaching. However, even assuming for the sake of argument that the referenced FIG. 50(d) or other portion of Okada illustrates a (horizontal) crystal growth direction of a silicon grain and/or provides teachings concerning

electron mobility with respect to a grain boundary, Applicant respectfully submits that the Office Action makes no mention as to how either Inoue or Okada is thought to relate this crystal growth to (the arrangement of) the charge coupled device(s) recited in claim 2, such that the charge transfer direction of the charge coupled device(s) is coincident with the crystal growth direction.

In this regard, upon review of Okada, Applicant finds only a limited mention of any CCD device in column 45, lines 1-10, and then only as a light receiver for spectrochemical analysis, a function that is unrelated to the relevant limitation of claim 2. Applicant recognizes that Okada may not be viewed or attacked as a single reference in the context of a combination of references under 35 U.S.C. 103(a); however, in the present case, Applicant submits that Okada does not provide the teaching(s) alleged in the Office Action. That is, as referenced above, the Office Action maintains that Okada provides a teaching of a charge transfer direction of a charge coupled device (specifically, the Office Action states in lines 4-6 of page 3 that "Okada teaches ...a charge transfer direction of the ... charge coupled device(s)..."), when, in fact, Okada provides no such teaching.

As a result, the Office Action fails to explain why an artisan of ordinary skill practicing Inoue (which relates to charge coupled devices) at the time of the invention would have been motivated to look to Okada (which does not relate to charge coupled devices in any manner relevant to the subject matter of claim 2) to modify Inoue and obtain the subject matter of claim 2.

Accordingly, for at least the above reasons, Applicant respectfully submits that claim 2 is in condition for allowance. Independent claims 16, 19, 24, 25, and 26, which recite the same or similar features as those discussed above, are therefore also believed to be in condition for allowance for at least the same reasons. Accordingly, dependent claims 6, 11, 12, 14, 17, 18, and 20-23 are believed to be in condition for allowance for at least the same reasons.

Based on the above, all claims are believed to be in condition for allowance, and such action is hereby requested in the Examiner's next official communication.

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Please apply any charges or credits to deposit account 06-1050.

Respectfully submitted,

Date: April 6, 2004



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